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EXAMINER

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Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6, and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schloeman et al. (US 6726300 B2) in view of Ghozeil et al. (US 6375295 B1).

Regarding claim 1:

Schloeman et al. disclose a driving apparatus for at least one recording head, the apparatus comprising:

a first waveform signal receiver (printhead assembly 12) that receives, through signal lines (col. 9, lines 47-49 and Fig. 1), a plurality of waveform signals (first fire pulse 124 and second fire pulse 126) representing various recording modes (col. 9, lines 26-28);

a first drive signal provider (first multiplexer 152) that generates drive signals (zone fire pulses) on the basis of the plurality of waveform signals received by the first waveform signal receiver (col. 9, lines 31-35), and supplies the drive signals to one of recording element groups (first zone) included in the at least one recording head (Fig. 4);

a second drive signal provider (second multiplexer 154) that generates drive signals on the basis of the waveform signals (col. 9, lines 36-39), and supplies the drive signals to another recording element group (fourth zone).

Schloeman et al. do not expressly disclose a first delay circuit that delays the waveform signals received by the first waveform signal receiver; and

the second drive signal provider generates drive signals on the basis of the delayed waveform signals delayed by the first delay circuit.

However, Ghozeil et al. disclose a first delay circuit (delay element 56) that delays the waveform signals received by the first waveform signal receiver (col. 3, lines 38-42); and

the second drive signal provider (e.g. select logic 40) generates drive signals on the basis of the delayed waveform signals delayed by the first delay circuit (col. 3, lines 38-42).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize a delay circuit between Schloeman's firing zones. The motivation for doing so, as taught by Ghozeil et al., is to reduce EMI without noticeably affecting image quality (col. 3, lines 42-44).

Regarding claim 2:

Schloeman et al. also disclose that the number of recording element groups is N that is a natural number of two or more (col. 6, lines 43-46), and

the apparatus comprises:

N drive signal providers (col. 9, lines 51-55 state that the plurality of fire pulse signals may be coupled through a multiplexer to each particular zone, providing N drive signal providers 152), including the first and second drive signal providers, each of which generates drive signals on the basis of the plurality of waveform signals received by the first waveform signal receiver, and supplies the drive signals to a corresponding one of the recording element groups (e.g. col. 9, lines 31-34).

Ghozeil et al. also disclose that the apparatus comprises:

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(N-1) delay circuits (Fig. 3), including the first delay circuit, connected to each other in series (Fig. 3), each of the delay circuits sequentially delays the waveform signals delayed by the first delay circuit (col. 3, lines 38-42 and Fig. 3); and

all but the first drive signal provider generate drive signals on the basis of waveform signals delayed by a corresponding one of the (N-1) delay circuits (col. 3, lines 38-42).

Regarding claim 3:

Schloeman et al. also disclose that the number of recording element groups is N that is a natural number of three or more (Fig. 4 shows at least 8 zones), and

the apparatus further comprises:

third to Nth drive signal providers (zone 1 through zone N-3 in Fig. 4) each of which generates drive signals on the basis of the waveform signals and supplies the drive signals to another recording element group (e.g. col. 9, lines 31-34).

Ghozeil et al. also disclose that the apparatus further comprises:

second to (N-1)th delay circuits connected to the first delay circuit (Fig. 3), the second to (N-1)th delay circuits further delaying the waveform signals delayed by the first delay circuit (col. 3, lines 38-42); and

each of the third to Nth drive signal providers generate drive signals on the basis of waveform signals delayed by a corresponding one of the (N-2) delay circuits (col. 3, lines 38-42).

Regarding claim 4:

Schloeman et al. also disclose that N is four or more (Fig. 4).

Ghozeil et al. also disclose that the second to (N-1)th delay circuits are connected to each other in series (Fig. 3).

Regarding claim 6:

Ghozeil et al. also disclose that the degree of delay of the waveform signals by the first delay circuit is changeable (col. 3, lines 42-44 and col. 4, lines 14-16).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize a changeable delay circuit into the invention of Schloeman et al. as modified by Ghozeil et al. The motivation for doing so, as taught by Ghozeil et al., is to select the amount of delay that will result in a desired level of EMI suppression (col. 3, lines 42-44).

Regarding claim 8:

Schloeman et al. also disclose that each of the plurality of waveform signals is for forming one dot (col. 11, lines 32-43), and the waveform signals differ from each other in pulse width (col. 9, lines 26-28).

Regarding claim 9:

Schloeman et al. also disclose that each of the plurality of waveform signals is for forming one dot (col. 11, lines 32-43), and dots formed from the plurality of waveform signals are different from each other in tone (col. 9, lines 26-28 state that the fire pulses differ in width, thus forming different sized dots and different tones).

Regarding claim 10:

Schloeman et al. as modified by Ghozeil et al. disclose all limitations of claim 1, and **Schloeman et al. also disclose** an image recording apparatus comprising:

a waveform signal generator (electronic controller 20) that generates a plurality of waveform signals (fire pulses 124 and 126; col. 1, lines 35-37) representing various recording modes (col. 9, lines 26-28);

at least one recording head (printhead die 40) including a plurality of recording element groups (zones; Fig. 3); and

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a driving apparatus (zone decode logic 122) that drives the at least one recording head.

Claims 7, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schloeman et al. as modified by Ghozeil, as applied to claim 1 above, and further in view of Imai et al. (JP 2000-158643).

Regarding claim 7:

Schloeman et al. as modified by Ghozeil et al. disclose all claimed limitation of claim 1, and Schloeman et al. also disclose that each of the drive signal providers select one of the plurality of waveform signals so as to generate and supply a drive signal to each of the recording elements of the corresponding group (e.g. col. 9, lines 31-34).

Schloeman et al. as modified by Ghozeil et al. do not expressly disclose that the drive signal providers receive image data for the recording elements, and selects one of the plurality of waveform signals on the basis of the image data so as to generate and supply a drive signal.

However, Imai et al. disclose that the drive signal providers (selectors 33) receive image data (printing data) for the recording elements and select one of the plurality of waveform signals on the basis of the image data (paragraph 47) so as to generate and supply a drive signal (paragraph 49, lines 1-3).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize drives signal providers that select a waveform based on the image data into the invention of Schloeman et al. as modified by Ghozeil et al. The motivation for doing so, as taught by Imai et al., is to easily control gradation by choosing a printing wave (paragraph 50, lines 10-11).

Regarding claim 11:

Schloeman et al. as modified by Ghozeil et al. disclose all limitations of claim 10, and Schloeman et al. also disclose an image data generator (electronic controller 20) that outputs image data (nozzle data; col. 4, lines 14-20 and col. 8, lines 55-64), wherein each drive signal provider selects one of the plurality of waveform signals so as to generate and supply a drive signal to each of the recording elements of the corresponding group (e.g. col. 9, lines 31-34).

Schloeman et al. as modified by Ghozeil et al. do not expressly disclose an image data generator that outputs, to each drive signal provider, image data for recording elements, wherein each drive signal provider selects one of the plurality of waveform signals on the basis of the image data.

However, Imai et al. disclose an image data generator () that outputs, to each drive signal provider (selectors 33), image data (printing data) for recording elements, wherein each drive signal provider selects one of the plurality of waveform signals on the basis of the image data (paragraph 47) so as to generate and supply a drive signal (paragraph 49, lines 1-3).

Regarding claim 12:

Imai et al. also disclose that the waveform signal generator generates the plurality of waveform signals repeatedly in constant printing cycles (paragraph 48, lines 1-5).

Allowable Subject Matter

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 contains allowable subject matter since the prior art of record does not teach a driving apparatus comprising a second waveform signal receiver that receives, through signal

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lines, a plurality of waveform signals representing various recording modes in combination with other features and limitations of claim 5.

Response to Arguments

Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection. Please see the above rejection to Schloeman et al. in view of Ghozeil et al., which discloses drive signal providers that provide waveform signals to recording element groups.

In response on applicant's argument that Ghozeil's delay element cannot delay a plurality of waveform signals, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Communication with the USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelby Fidler whose telephone number is (571) 272-8455. The examiner can normally be reached on MWF 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vip Patel can be reached on (571) 272-2458. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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 9/15/06

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